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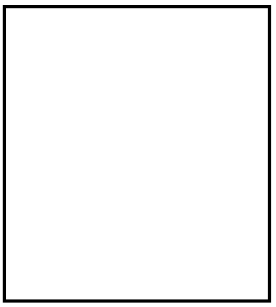

PROPOSAL TO INVESTIGATE

IMAGE COMPRESSION

NGA Review Complete

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Submitted by

[redacted]

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April 7, 1964

PROPOSAL TO INVESTIGATE IMAGE COMPRESSION

This is a proposal to conduct research on the image integration capabilities of the human eye. The purpose of the work will be to explore the feasibility of enhancing operator image recognition performance by rapidly presenting several images of the same target where any single image would be unrecognizable or near the recognition threshold. If this technique, which might be called "image compression," lowers the target recognition threshold, it should be possible to improve the PIs' performance by having them view images of the same target obtained on different missions and, within limits to be determined, obtained under different photographic conditions.

There are questions regarding the amount of variation in such factors as scale, obliquity, sun altitude, and image orientation that can be tolerated and still achieve improvement through image compression. But the question that must be answered first is:

> Will image compression lower target recognition thresholds when all factors are held constant from one frame of photography to the next?

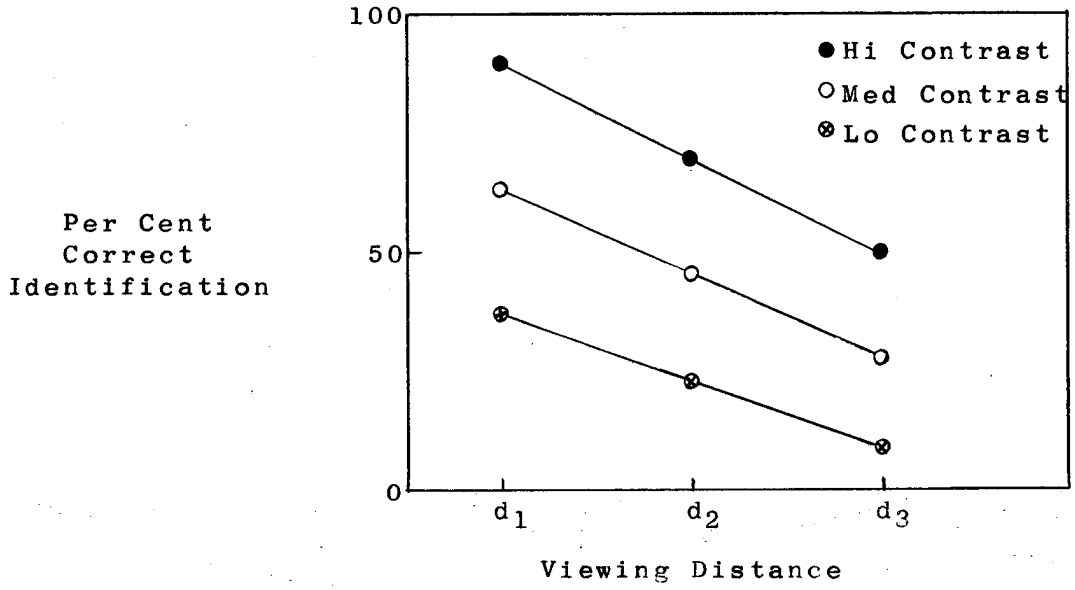
If the answer to this initial question is significantly positive, that is, if image compression significantly improves recognition performance, then the effects of variations in the other factors should be investigated and specified quantitatively. Following is a brief discussion of how we propose to answer the first question.

The Targets. The targets will be three-dimensional, block letters of the alphabet. One set will be black, one set dark gray, and one set light gray. Each set will be mounted on a separate flat, white surface in the form of a matrix:

Y	N			
Z				

The Photography. The mounted block letters will be photographed using an animation table to produce a continuous loop of 16mm motion picture film. Three loops of film will be prepared. The individual frames within each loop will be identical. However, the photographs will be prepared so that when a single frame is projected, the letters will be near the recognition threshold at a specified viewing distance.

Experimental Procedure. First, recognition thresholds will be obtained for the various letters when only a single frame is projected. They will be obtained for the three target contrasts and at three viewing distances to yield data like this:



Viewing distance and contrast will be varied so that the effects of image compression may be evaluated for different performance levels.

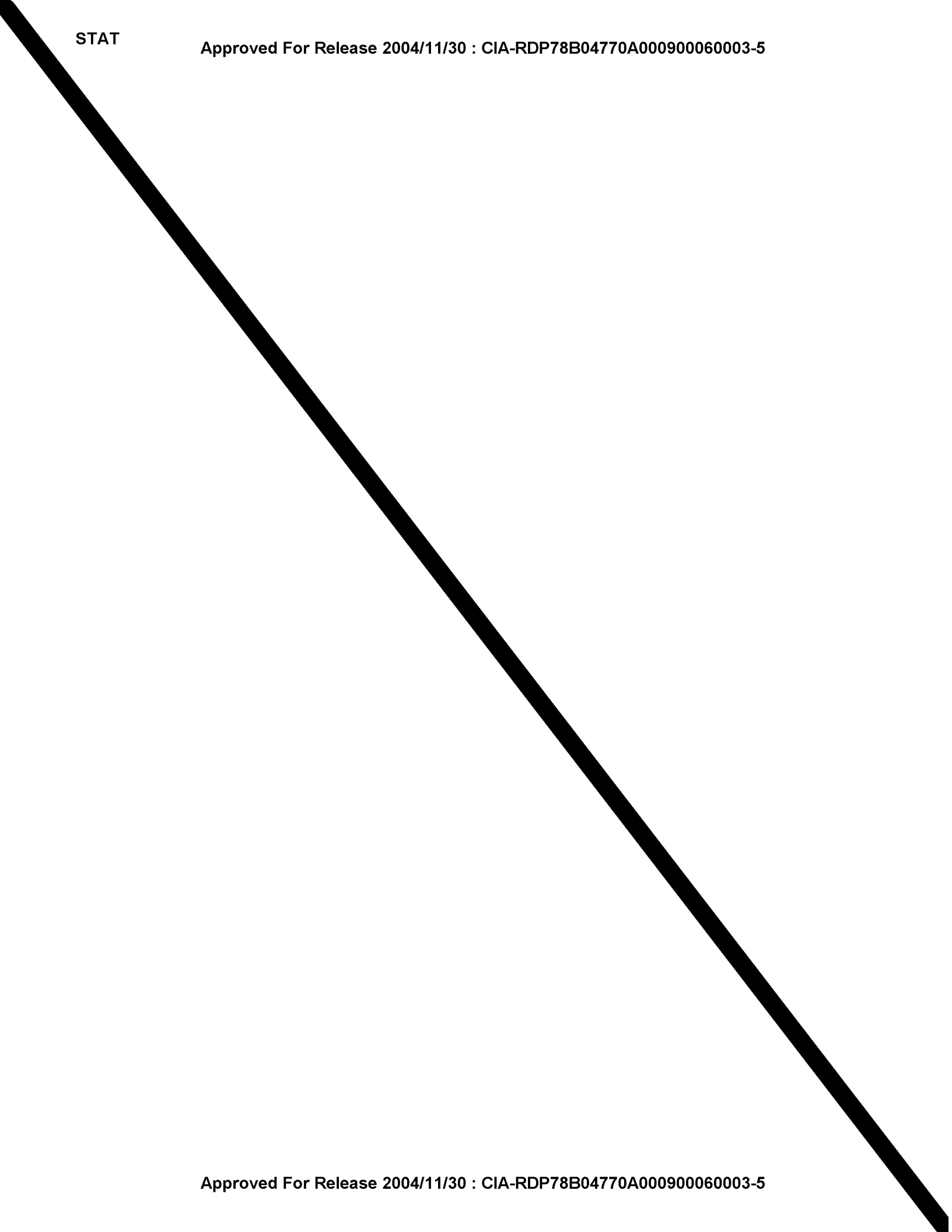
Finally, the continuous loops of film will be projected at different projection rates and viewed at the distances used in the single frame viewing. This will yield data showing the effectiveness of image compression and the relative merits of different compression rates.

If positive results are obtained, additional studies will be performed to determine the degree of variation in the following factors that can be tolerated and still achieve improved performance through image compression:

1. Scale
2. Tilt
3. Orientation
4. Sun altitude
5. Sun azimuth

It must be emphasized that this is a methodological study, and we may find it necessary to vary the procedure outlined above as the study progresses. Our purpose is to thoroughly evaluate the potentiality of image compression for enhancing target recognition.

The attached cost estimate covers only this first phase of work. At the end of this phase, a written report will be presented which will include the results of the study, our recommendations for additional research, and a detailed estimate of the cost of that research.



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Notes

1. The overhead rate shown in this proposal is a bidding rate. Overhead is allocated to contracts on the basis of a rate derived from actual overhead expenses allowable under cost-type contracts in accordance with ASPR XV and is audited each calendar year by the U.S. Navy Area Audit Office, 929 South Broadway, Los Angeles 15, California.

2. Bidder is not dominant in its field of operation and with affiliates employs fewer than 500 employees.

3. The prices of the items covered do not exceed those paid by any other purchaser from the contractor and the Government is placed in the most favored price category.

4. Prices are based on straight time.

5. Bidder represents that he has not employed or retained a company or person (other than a full-time employee) to solicit or secure this contract and agrees to furnish information thereto as requested by the Contracting Officer.

6. Bidder is incorporated in the State of Nevada.

7. Bidder is a profit institution as determined by the Bureau of Internal Revenue.

8. No subcontracting is contemplated.

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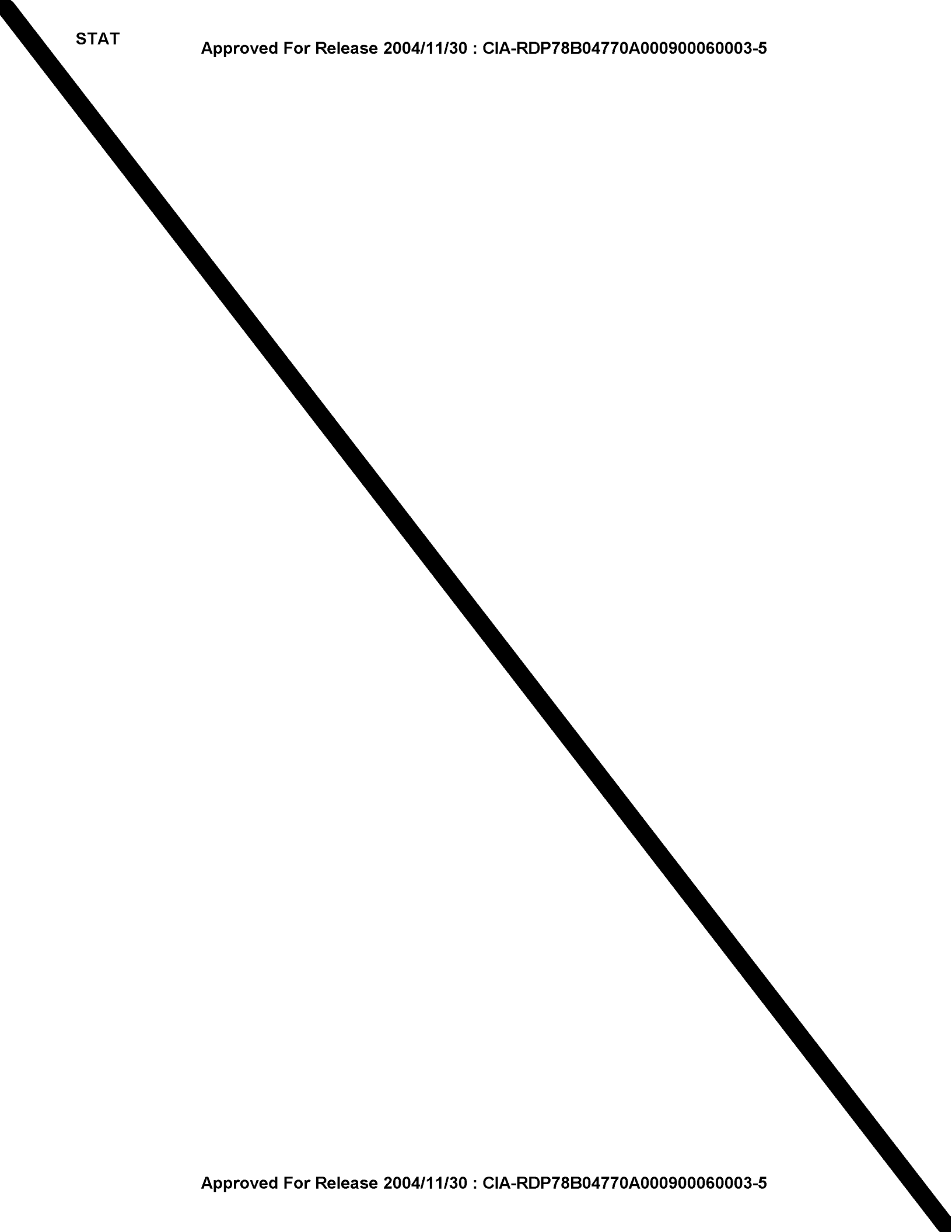

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